are often of concern in effluent from wastewater treatment plants but are required under the NPDES program to meet numeric water quality standards.

Many of the toxic metals are present at significant concentrations in most soils but in sorbed nonbioavailable forms. Sediment often introduces significant concentrations of metals such as zinc into waterbodies. It is then a matter of whether instream conditions promote bioavailable dissolved forms of the metal.

Nonpoint sources of metals first reflect the characteristics of watershed soils. In addition, many older industrial areas have soil concentrations of certain metals that are elevated due to past industrial practices. Movement of metals from soil to watershed is largely a function of the erosion and delivery of sediment.

In certain watersheds, a major source of metals loading is provided by acid mine drainage. High acidity increases the solubility of many metals, and mines tend to be in mineral-rich areas. Abandoned mines are therefore a continuing source of toxic metals loading in many streams.

Toxic Concentrations of Bioavailable Metals Along the Stream Corridor

Most metals have a tendency to leave the dissolved phase and attach to suspended particulate matter or form insoluble precipitates. Conditions that partition metals into particulate forms (presence of suspended sediments, dissolved and particulate organic carbon, carbonates, bicarbonates, and other ions that complex metals) reduce potential bioavailability of metals. Also, calcium reduces metal uptake, apparently by competing with metals for active uptake sites on gill membranes. pH is also an important water quality factor in metal bioavailability. In general, metal solubilities are lower at near neu-

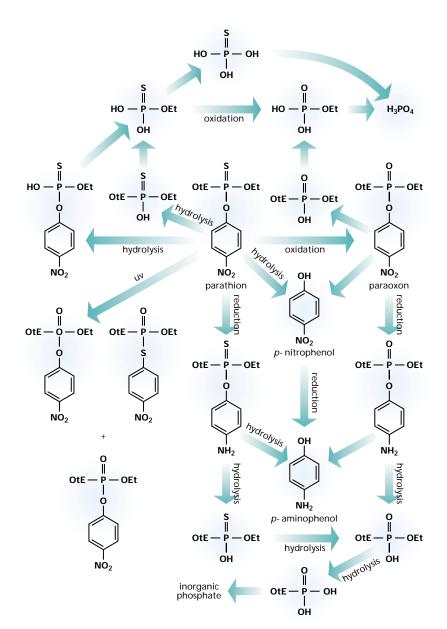


Figure 2.29: Metabolic reactions for a single parent pesticide. Particles break down through processes of hydrolysis, oxidation, reduction, and photolysis.

tral pH's than in acidic or highly alkaline waters.

Ecological Functions of Soils

Soil is a living and dynamic resource that supports life. It consists of inorganic mineral particles of differing sizes (clay, silt, and sand), organic matter in various stages of decomposition, numerous species of living organisms,